REMARKS

Claims 1-12 are pending in this Application. In the Office Action Summary page, the Examiner indicated that the present Office Action was responsive to the Applicant's communication filed September 28, 2005 and that claims 1-12 were pending and rejected. However, in the Detailed Action, the Examiner indicated that claims 1-12, 24 and 25 were currently pending, and that the present Office Action was is response to the amendment filed by the applicant on 2/18/05. The present Office Action appears to be in response to the amendment filed September 28, 2005, with claims 1-12 pending, and replies herein accordingly.

35 U.S.C. §103(a) – Claims 7, 8, 11 and 12

The Examiner rejected claims 7, 8, 11 and 12 under 35 U.S.C. §103(a) as being unpatentable over Schramm et al. (US Ref. No. 6,208,663) in view of Fong et al. (US Ref No. 6,931,569) and Cheng et al. (US Ref No 2002/0191544). In making the rejection, the Examiner stated:

> Regarding claim 7, Schramm discloses, in Figs. 3 and 5, a physical automatic request repeat apparatus employed by a subscriber unit, comprising: a transmitter having (RBS 22): means for receiving data (a radio base stations 22); means for formatting the received data into packets for transmission to the receiver, each packet having a particular encoding/data modulation (a radio base stations 22; column 5, lines 46-58); means for transmitting the packets (colunm 5, lines 25-45); means for retransmitting a packet, if an acknowledgment for that packet is not received (colunm 7, lines 39-53); means for collecting retransmission statistics (column 7, lines 1-13); and means for adjusting each particular data modulation using the collected retransmission statistics (column 7, lines 1-38); and a receiver having (MS 12); means for receiving packets (MS 12)); means for decoding and error checking each received packet (column 5, lines 46-colunm 6, line 11). Further, Schramm discloses that the ARQ protocol is the RLC layer. An LLC frame to be transmitted by RBS is segmented into RLC blocks then transmitting the blocks to the mobile station through the physical layer (data is received from a higher layer ARQ mechanism).
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> Schramm does not disclose generating an acknowledgment at the physical layer and the physical layer ARQ mechanism uses packets, which are smaller in size than the higher layer ARQ mechanism.
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> A physical layer ARQ mechanism is well known in the art. Fong teaches a dual protocol layer automatic retransmission request scheme for wireless air interface (see fig. 2 and column 5, lines 26-52). Fig. 4 illustrates that each packet received by a physical layer form a link layer is packaged into multiple physical layer frames in order to support a lower data rate (column 6, lines 15-30). Further, Fong teaches that layer 1 ARQ operations provide a quick recovery for physical layer frames that are lost or received erroneously though retransmission of the physical layer frames.
>
> It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Schramm's ARQ method to

incorporate the teachings from Fong of a dual type arrangement and formatting the received data blocks into smaller size, the motivation being that by including two levels of ARQ operations, layer 1 ARQ operations provide a quick recovery for physical layer frames that are lose or received erroneously through retransmission of the physical layer frames and the ARQ system will be more reliable by eliminating any significant additional overhead and provides robust operations across the wireless link (column 2, lines 39-60).

Schramm in view of Fong does not disclose a physical layer ARQ mechanism is transparent to the higher layer ARQ mechanism. Cheng teaches that a dual layer ARQ scheme where a physical layer ARQ mechanism is transparent to the higher layer ARQ mechanism (paragraphs 0042-0043).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Schramm's in view of Fong ARQ method to incorporate the teachings from Cheng of a physical layer ARQ mechanism is transparent to the higher layer ARQ mechanism, since Cheng suggests in paragraph 0043 that the physical layer ARQ mechanism being transparent to the higher layer ARQ mechanism would reduce implementation complexity and eliminates delay.

Regarding claim 8, Schramm discloses the base station wherein the particular encoding/data modulation is forward error correction FEC encoding /data modulation (column 7, line 54-column 8, line 11).

Regarding claim 11, Schramm discloses the base station wherein the acknowledgments are transmitted on the fast feedback channel using a CDMA air interface (column 4, lines 49-56).

Regarding claim 12, Schramm discloses the base station apparatus whereby said means for generating generates a negative acknowledgment, if that packet has an unacceptable error rate (column 7, lines 39-45).

In order to establish a *prima facie* case of obviousness, the Examiner must demonstrate there is a suggestion or motivation, either in the references themselves, or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine the reference teachings. Furthermore, the prior art references must teach or suggest <u>all</u> of the claim features. The

Examiner is not free to pick bits and pieces from the prior art and, with the hindsight benefit of the Applicant's disclosure, attempt to reconstruct the invention. Orthopedic Equipment Inc. v. U.S., 217 U.S.P.Q. 193, 199 (Fed. Cir. 1983).

There is no teaching, suggestion, or motivation in the Schramm, Fong, or Cheng references to store the packets for retransmission in a buffer memory incorporated into the transmitter, limit the number of retransmissions to an operator-defined integer value, and clear the buffer memory after the integer value is reached.

The Applicant's claimed invention in amended independent claim 7 on the other hand, recites:

> A base station implementing physical layer automatic repeat request, including a transmitter and a receiver, the base station for receiving data in data blocks from a higher layer ARQ mechanism, the base station comprising:
>
> a physical layer transmitter for receiving the data from the higher layer ARQ mechanism in data blocks, formatting the received data blocks into packets, the packets being smaller in size than the data blocks, each packet having a particular encoding/data modulation, transmitting the packets, storing the packets for retransmission in a buffer memory incorporated into the transmitter, monitoring a return channel for receipt of an acknowledgment for each packet that the packet has been received, limiting the number of retransmissions to an operator-defined integer value, clearing the buffer memory after the integer value is reached, and retransmitting packets in response to failure to receive a corresponding acknowledgment for a given packet;
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> an acknowledgment receiver for receiving the corresponding acknowledgment;
>
> an adaptive modulation and coding controller for collecting retransmission statistics and adjusting the particular data encoding/modulation using the collected statistics;
>
> a physical layer receiver for demodulating received packets;
>
> a combiner/decoder for buffering, decoding and detecting packet errors; and

> an acknowledgment generator for generating an acknowledgment for each packet if that packet has an acceptable error rate; and
>
> wherein a physical layer ARQ mechanism comprising the physical layer transmitter and the acknowledgement receiver is transparent to the higher layer ARQ mechanism.

which is not taught nor suggested in the Schramm, Fong, or Cheng references. Accordingly, Applicant's claimed invention as claimed in amended independent claim 7 is patentably distinct from the Schramm, Fong, and Cheng references, whether taken alone or in any combination with one another.

Claims 8, 11, and 12 depend from the Applicant's patentable amended independent claim 7, and are therefore patentable for at least the same reasons as Applicant's patentable amended independent claim 7.

35 U.S.C. §103(a) – Claims 1, 2, 5 and 6

The Examiner rejected claims 1, 2, 5 and 6 under 35 U.S.C. §103(a) as being unpatentable over Sipola (US Ref. No. 6,529,561) in view of Schramm et al. (US Ref. No. 6,208,663) and further in view of Fong et al. (US Ref No. 6,931,569) and Cheng et al. (US Ref No 2002/0191544). In making the rejection, the Examiner stated:

> Regarding claim 1, Sipola discloses, in Figs. 2 and 5, a base station implementing physical layer automatic request, including a transmitter (260) and a receiver (264), the base station comprising:
>
> a physical layer transmitter for receiving data (270), formatting the received data into packets, each packet having a particular encoding/data modulation, transmitting the packets (202, 204) (colunm 10, lines 7-15; steps 500, 502), and retransmitting packets in response to failure to receive a corresponding acknowledgment (234) for a given packet (column 10, lines 16-28);

an ACK receiver for receiving the corresponding acknowledgment (step 5104 column 7, line 60-colunm 8, line 3); and a physical layer receiver for demodulating (2 10) the packets (column 10, lines 29-40);

a combiner/decoder (222, 218) for buffering, decoding and detecting packet errors (step 516; column 10, lines 54-60); and an acknowledgment generator (224) for generating an acknowledgment for each packet, if that packet has an acceptable error rate (step 510; column 7, line 60-column 8, line 3).

However, Sipola does not expressly disclose collecting retransmission statistics and adjusting each particular encoding/data modulation using the collected retransmission statistics (as in claim 1); and a CDMA air interface (as in claim 5).

Schramm teaches that the radio base station RBS 22 counts the number of requests for retransmitted blocks and use alternative FEC coding and/or modulation scheme when the counted number of erroneously transmitted blocks exceeds some predetermined threshold (column 7, lines 1-12).

It would have been obvious to one ordinary skill in the art at the time of the invention was made add a collecting retransmission statistics method, such as that suggested by Schramm, in the method of Sipola in order to reduce the probability that the retransmitted block is received erroneously and improve overall system performance (column 4, lines 3-11).

Sipola and Schramm disclose that the ARQ protocol is the RLC layer. An LLC frame to be transmitted by RBS is segmented into RLC blocks then transmitting the blocks to the mobile station through the physical layer (data is received from a higher layer ARQ mechanism). Sipola in view of Schramm does not expressly disclose generating an acknowledgment at the physical layer and the physical layer ARQ mechanism uses packets, which are smaller in size than the higher layer ARQ mechanism.

A physical layer ARQ mechanism is well known in the art. Fong teaches a dual protocol layer automatic retransmission request scheme for wireless air interface (see fig. 2 and column 5, lines 26-52). Fig. 4 illustrates that each packet received by a physical layer form a link layer is packaged into multiple physical layer frames in order to support a lower data rate (column 6, lines 15-30). Further, Fong teaches that layer 1 ARQ operations provide a quick recovery for physical layer frames that are lost or received erroneously though retransmission of the physical layer frames.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sipola in view of Schramm's

ARQ method to incorporate the teachings from Fong of a dual type arrangement and formatting the received data blocks into smaller size, the motivation being that by including two levels of ARQ operations, layer 1 ARQ operations provide a quick recovery for physical layer frames that are lose or received erroneously through retransmission of the physical layer frames the ARQ system will be more reliable by eliminating any significant additional overhead and provides robust operations across the wireless link (column 2, lines 25-60).

Sipola in view of Schramm further in view of Fong does not disclose a physical layer ARQ mechanism is transparent to the higher layer ARQ mechanism.

Cheng teaches that a dual layer ARQ scheme where a physical layer ARQ mechanism is transparent to the higher layer ARQ mechanism (paragraphs 0042-0043).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sipola in view of Schramm's further in view of Fong ARQ method to incorporate the teachings from Cheng of a physical layer ARQ mechanism is transparent to the higher layer ARQ mechanism, since Cheng suggests in paragraph 0043 that the physical layer ARQ mechanism being transparent to the higher layer ARQ mechanism would reduce implementation complexity and eliminates delay.

Regarding claim 5, Schramm teaches an ARQ techniques use an alternative modulation/coding scheme using FDMA and CDMA air interface wherein the acknowledgments are transmitted on a fast feedback channel.

It would have been obvious to one ordinary skill in the art at the time of the invention was made to use CDMA, such as that suggested by Schramm, in the radio transmission system of Sipola in order to minimize interference and to increase the capacity data throughput.

Regarding claim 2, Sipola discloses the base station wherein the particular encoding/data modulation is forward error correction FEC (column 2, line 29-37).

Regarding claim 6, Sipola discloses the base station whereby the acknowledgment generator transmits a negative acknowledgment, if any packet has an unacceptable error rate (column 7, line 60-column 8, line 3).

The Applicant's claimed invention in amended independent claim 1, recites:

A base station implementing physical layer automatic repeat request, including a transmitter and a receiver, the base station for

receiving data in data blocks from a higher layer ARQ mechanism, the base station comprising:

a physical layer transmitter for receiving the data from the higher layer ARQ mechanism in data blocks, formatting the received data blocks into packets, the packets being smaller in size than the data blocks, each packet having a particular encoding/data modulation, transmitting the packets, storing the packets for retransmission in a buffer memory incorporated into the transmitter, monitoring a return channel for receipt of an acknowledgment for each packet that the packet has been received, limiting the number of retransmissions to an operator-defined integer value, clearing the buffer memory after the integer value is reached, and retransmitting packets in response to failure to receive a corresponding acknowledgment for a given packet;

an acknowledgment receiver for receiving the corresponding acknowledgment;

an adaptive modulation and coding controller for collecting retransmission statistics and adjusting the particular data encoding/modulation using the collected statistics;

a physical layer receiver for demodulating received packets;

a combiner/decoder for buffering, decoding and detecting packet errors; and

an acknowledgment generator for generating an acknowledgment for each packet if that packet has an acceptable error rate; and

wherein a physical layer ARQ mechanism comprising the physical layer transmitter and the acknowledgement receiver is transparent to the higher layer ARQ mechanism.

which is not taught nor suggested in the Sipola reference, nor do the Schramm, Fong, or Cheng references cure this lack of teaching. Accordingly, Applicant's claimed invention as claimed in amended independent claim 1 is patentably distinct from the Sipola, Schramm, Fong, and Cheng references, whether taken alone or in any combination with one another.

Claims 2, 5, and 6 depend from the Applicant's patentable amended independent claim 1, and are therefore patentable for at least the same reasons as Applicant's patentable amended independent claim 1.

35 U.S.C. §103(a) – Claim 9

The Examiner rejected claim 9 under 35 U.S.C. §103(a) as being unpatentable over Schramm in view of Fong and Cheng as applied to claim 7, and further in view of Agee (US Ref. No. 6,128,276). In making the rejection, the Examiner stated:

> Schramm in view of Fong and Cheng discloses all the claim limitations as stated above except for: the packets are transmitted using an OFDMA air interface in which frequency sub channels in an OFDMA set may be selectively nulled.
>
> Agee teaches a radio communication method that is compatible with discrete multiple tone and orthogonal frequency-division multiplex-like frequency channelization techniques (column 4, line 19-column 5, line 40).
>
> It would have been obvious to one ordinary skill in the art at the time of the invention was made to add a method that transmit packets using an OFDMA air interface, such as that suggested by Agee, in the method of Schramm in view of Fong and Cheng in order to allow stationary and linear channel distortion to be modeled as an exactly multiplicative effect on the transmit spreading code.

There is no teaching, suggestion, or motivation in the Schramm, Fong, or Cheng references to store the packets for retransmission in a buffer memory incorporated into the transmitter, limit the number of retransmissions to an operator-defined integer value, and clear the buffer memory after the integer value

is reached, as is recited in the Applicant's patentable amended independent claim 7. Furthermore, the Agee reference fails to cure these deficiencies.

Since claim 9 depends from the Applicant's patentable amended independent claim 7, claim 9 is patentable for at least the same reasons as patentable amended independent claim 7.

35 U.S.C. §103(a) – Claim 10

The Examiner rejected claim 10 under 35 U.S.C. §103(a) as being unpatentable over Schramm in view of Fong and Cheng as applied to claim 7, and further in view of Birru (US App. No. 2002/0037058). In making the rejection, the Examiner stated:

> Schramm in view of Fong and Cheng discloses all the claim limitations as stated above. Further, Schramm discloses that the invention is applied to all types of access methodologies including FDMA, TDMA, CDMA and hybrids thereof (column 4, lines 49-56).
>
> However, Schramm does not expressly discloses wherein the packet are transmitted using a single carrier having a frequency domain equalization (SC-FDE) air interface.
>
> Birru teaches that a multi-standard demodulator, which includes COMM, a frequency domain equalizer for single carrier results in a cost-effective solution compared to a time domain equalizer.
>
> It would have been obvious to one ordinary skill in the art at the time of the invention was made to use SC-FDE, such as that suggested by Bin-u, in the multi-access methodologies of Schramm in view of Fong and Cheng in order to provide cost effectiveness and multi-path performance (0059).

Again, there is no teaching, suggestion, or motivation in the Schramm, Fong, or Cheng references to store the packets for retransmission in a buffer memory

incorporated into the transmitter, limit the number of retransmissions to an operator-defined integer value, and clear the buffer memory after the integer value is reached, as is recited in the Applicant's patentable amended independent claim 7. Furthermore, the Birru reference fails to cure these deficiencies.

Since claim 10 depends from the Applicant's patentable amended independent claim 7, claim 10 is patentable for at least the same reasons as patentable amended independent claim 7.

35 U.S.C. §103(a) – Claim 3

The Examiner rejected claim 3 under 35 U.S.C. §103(a) as being unpatentable over Sipola, in view of Schramm, Fong and Cheng as applied to claim 1, and further in view of Agee. In making the rejection, the Examiner stated:

> Sipola in view of Schramm, Fong and Cheng discloses all the claim limitations as stated above except for: the packets are transmitted using an OFDMA air interface in which frequency sub channels in an OFDMA set may be selectively nulled.
>
> Agee teaches a radio communication method that is compatible with discrete multiple tone and orthogonal frequency-division multiplex-like frequency channelization techniques (column 4, line 19-column 5, line 40).
>
> It would have been obvious to one of ordinary skill in the art at the time of the invention was made to add a method that transmits packets using an OFDMA air interface, such as that suggested by Agee, in the method of Sipola in view of Schramm, Fon and Cheng in order to allow stationary and linear channel distortion to be modeled as an exactly multiplicative effect on the transmit spreading code.

There is no teaching, suggestion, or motivation in the Sipola, Schramm, Fong, or Cheng references to store the packets for retransmission in a buffer memory

incorporated into the transmitter, limit the number of retransmissions to an operator-defined integer value, and clear the buffer memory after the integer value is reached, as is recited in the Applicant's patentable amended independent claim 1. Furthermore, the Agee reference fails to cure these deficiencies.

Since claim 3 indirectly depends from the Applicant's patentable amended independent claim 1, claim 3 is patentable for at least the same reasons as patentable amended independent claim 1.

35 U.S.C. §103(a) – Claim 4

The Examiner rejected claim 4 under 35 U.S.C. §103(a) as being unpatentable over Sipola, in view of Schramm, Fong and Cheng as applied to claim 1, and further in view of Birru (US App. No. 2002/0037058). In making the rejection, the Examiner stated:

> Sipola in view of Schramm, Fong and Cheng discloses all the claim limitations as stated above. Further, Schramm discloses that the invention is applied to all types of access methodologies including FDMA, TDMA, CDMA and hybrids thereof. However, Sipola in view of Schramm, Fong and Cheng does not expressly disclose wherein the packets are transmitted using a single carrier having a frequency domain equalization (SC-FDE) air interface. Birru teaches that a multi-standard demodulator, which includes COMM, a frequency domain equalizer for single carrier results in a cost-effective solution compared to a time domain equalizer.
>
> It would have been obvious to one of ordinary skill in the art at the time of the invention was made to use SC-FDE, such as that suggested by Birru, in the multi-access methodologies of Sipola in view of Schramm, Fong and Cheng in order to provide cost effectiveness and multi-path performance (0059).

There is no teaching, suggestion, or motivation in the Sipola, Schramm, Fong, or Cheng references to store the packets for retransmission in a buffer memory incorporated into the transmitter, limit the number of retransmissions to an operator-defined integer value, and clear the buffer memory after the integer value is reached, as is recited in the Applicant's patentable amended independent claim 1. Furthermore, the Birru reference fails to cure these deficiencies.

Since claim 4 depends from the Applicant's patentable amended independent claim 1, claim 4 is patentable for at least the same reasons as patentable amended independent claim 1.

Reconsideration and entry of this amendment is respectfully requested.

Respectfully submitted,

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